① Solve for x

(a) $\dfrac{800}{100 - e^{\frac{x}{2}}} = 50$

(b) $\ln\sqrt{x+2} = 1$

(c) $\ln(x+1) - \ln(x-2) = \ln(x)$

② Expand $\ln\left(\dfrac{(x^2+3)^2}{x\sqrt[3]{x^2+1}}\right)$

$\ln\frac{a}{b}$ $\ln a - \ln b$

$\ln ab = \ln a + \ln b$

$\ln a^b = b\ln a$

$\ln(x^2+3)^2 - \ln x\sqrt[3]{x^2+1}$

$2\ln(x^2+3) - (\ln x + \ln\sqrt[3]{x^2+1})$

$\ln(x^2+1)^{\frac{1}{3}}$

$2\ln(x^2+3) - \ln x - \frac{1}{3}\ln(x^2+1)$

1a) $\left(\frac{800}{100 - e^{\frac{x}{2}}}\right) = 50$

$\frac{800}{50} = \frac{5000 - 50e^{\frac{x}{2}}}{50}$

$16 = 100 - e^{\frac{x}{2}}$

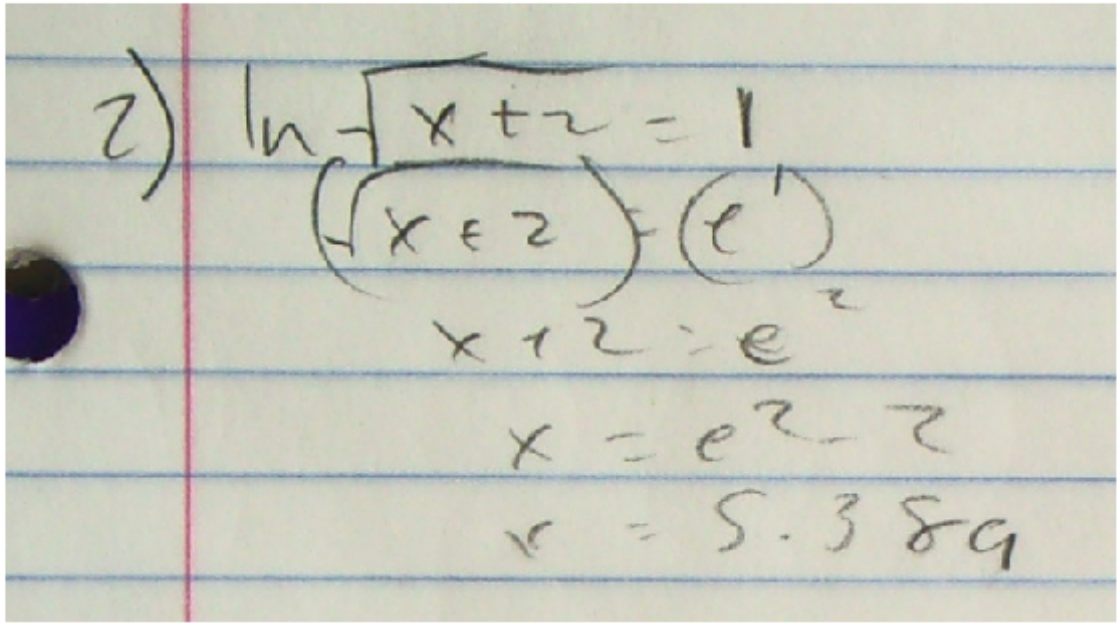
-100

$-84 = e^{\frac{x}{2}}$

$\ln(84) = \left(\frac{x}{2}\right) 2$

$2\ln(84) = x$

$8.862 = x$


2) ln √(x+2) = 1
(√(x+2)) = (e^1)
x + 2 = e^2
x = e^2 − 2
x = 5.389

c.) $\ln(x+1) - \ln(x-2) = \ln(x)$

$\ln\left(\frac{x+1}{x-2}\right) = \ln(x)$

$\frac{x+1}{x-2} = x$

$x+1 = x(x-2)$

$x+1 = x^2-2x$

$0 = x^2-3x-1$

$x = 3.303, -0.303$

clocks

extraneous

$(0, \infty)$

3.9 Q.R.

(#2) write 7^x as a power of e

$\ln 7^x = e^{x \ln 7} \rightarrow e^{x \ln 7} \rightarrow e^{\ln 7^x} = 7^x$

$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} e^u = e^u \frac{du}{dx}$$

$$\frac{d}{dx} a^x = a^x \cdot \ln a$$

$$\frac{d}{dx} a^u = a^u \ln(a) \frac{du}{dx}$$

$$\frac{d}{dx} \ln x = \frac{1}{x}$$

$$\frac{d}{dx} \ln u = \frac{1}{u} \cdot \frac{du}{dx}$$

$$\frac{d}{dx} \log_a x = \frac{1}{x \ln a}$$

$$\frac{d}{dx} \log_a u = \frac{1}{u \ln a} \cdot \frac{du}{dx}$$

Domain: $f(x) = \ln(x-3)$

$(3, \infty)$

$f'(x) = \frac{1}{x-3}$ ~~Domain~~ ~~$x \neq 3$~~

p. 174 Exploration

① $42°$ $t = 0$

② $72°$ $t \Rightarrow \infty$

③ 2nd derivative

warming → y'

fastest warming → y''

$t = 0$

$y = -0.01225(0.98)^t$

$y = -30(\ln(0.98))^2(0.98)^t$

④ $y = 72 - 30(0.98)^t$

$55 = 72 - 30(0.98)^t$

$-72 \quad -72$

$\frac{-17}{-30} = \frac{-30(0.98)^t}{-30}$

$t = \frac{\ln\left(\frac{-17}{-30}\right)}{\ln(0.98)} \approx 28.114 \text{ min}$

⑤ $y' = -30\ln(0.98)(0.98)^t$

$t = 28.114$

$y' = 0.343°/\text{min}$

Sect. 3.9

#1-28 (at least 12), 51, 52, 53

AMC